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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/611,815	LE ET AL.
	Examiner	Art Unit	
	Qing Chen	2191	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>30 June 2003</u>.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-27</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-27</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>30 June 2003</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1.   This is the initial Office action based on the application filed on June 30, 2003.

2.   **Claims 1-27** are pending.

Claim Objections

3.   **Claims 1-27** are objected to because of the following informalities:

- **Claims 1, 16, 17, and 27** recite the limitation "the source file system." Applicant is advised to change this limitation to read "the at least one source file system" for the purpose of providing it with proper explicit antecedent basis.

- **Claims 2-15** depend on Claim 1 and, therefore, suffer the same deficiency as Claim 1.

- **Claims 18-26** depend on Claim 17 and, therefore, suffer the same deficiency as Claim 17.

- **Claims 2-15 and 18-26** contain a typographical error: the article used to designate the statutory category of invention (*i.e.*, method and system, respectively) should be changed from "A" to "The."

- **Claims 4, 5, 8, 16, 19-21, and 27** recite the limitation "the sector-based I/O requests." Applicant is advised to change this limitation to read "the intercepted sector-based I/O requests" for the purpose of keeping the claim language consistent throughout the claims.

- **Claim 6** depends on Claim 5 and, therefore, suffers the same deficiency as Claim 5.

- **Claims 22-25** depend on Claim 21 and, therefore, suffer the same deficiency as Claim 21.

- **Claim 5** contains a typographical error: the word "and" should be added after the second-to-last limitation.

- **Claims 7 and 16** recite the limitation "the intercepted I/O requests." Applicant is advised to change this limitation to read "the intercepted sector-based I/O requests" for the purpose of providing it with proper explicit antecedent basis.

- **Claims 8-15** depend on Claim 7 and, therefore, suffer the same deficiency as Claim 7.

- **Claim 16** contains a typographical error: the "operating system mediating I/O requests between the imaging client and the source disk" limitation should commence on a new line.

- **Claim 27** contains a typographical error: a semicolon (;) should be added after the "for extracting the contents of the source disk ..." limitation.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5.   **Claims 3-16 and 18-27** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3, 16, and 18 recite the limitation "the source disk data." There is insufficient antecedent basis for this limitation in the claims. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "source disk data" for the purpose of further examination.

Claims 4-15 depend on Claim 3 and, therefore, suffer the same deficiency as Claim 3.

Claims 19-26 depend on Claim 18 and, therefore, suffer the same deficiency as Claim 18.

Claims 3, 16, 18, and 27 recite the limitation "the file system." There is insufficient antecedent basis for this limitation in the claims. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "a file system" for the purpose of further examination.

Claims 4-15 depend on Claim 3 and, therefore, suffer the same deficiency as Claim 3.

Claims 19-26 depend on Claim 18 and, therefore, suffer the same deficiency as Claim 18.

Claims 5, 6, and 16 recite the limitation "the imaging client." There is insufficient antecedent basis for this limitation in the claims. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "an imaging client" for the purpose of further examination.

Claims 7, 16, 21, and 27 recite the limitation "the files." There is insufficient antecedent basis for this limitation in the claims. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "files" for the purpose of further examination.

Claims 8-15 depend on Claim 7 and, therefore, suffer the same deficiency as Claim 7.

Claims 22-25 depend on Claim 21 and, therefore, suffer the same deficiency as Claim 21.

Claim 16 recites the limitation "the results." There is insufficient antecedent basis for this limitation in the claim. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "results" for the purpose of further examination.

Claim 16 recites the limitation "operating system mediating I/O requests between the imaging client and the source disk." However, the recited limitation does not commence with an active verb. A method is defined by its steps or acts and not by any structure. In the interest of compact prosecution, the Examiner subsequently interprets this limitation as reading "mediating I/O requests between an imaging client and the source disk" for the purpose of further examination.

Claims 18 and 27 recite the limitation "the file system(s)." There is insufficient antecedent basis for this limitation in the claims. In the interest of compact prosecution, the

Examiner subsequently interprets this limitation as reading "file system(s)" for the purpose of

further examination.

Claims 19-26 depend on Claim 18 and, therefore, suffer the same deficiency as Claim

18.

Claim 27 recites the limitation "the retrieved source disk data." There is insufficient

antecedent basis for this limitation in the claim. In the interest of compact prosecution, the

Examiner subsequently interprets this limitation as reading "source disk data" for the purpose of

further examination.

Claim Rejections - 35 USC § 102

6.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7.   **Claims 1-5 and 17-20** are rejected under 35 U.S.C. 102(e) as being anticipated by

Kedem et al. (US 6,477,624).

As per **Claim 1**, Kedem et al. disclose:

- while the source disk is in an unmodified, unprepared state, extracting the contents of the source disk and populating a destination image with the contents of the source disk such that the destination image may have a different sector-by-sector content than the source disk but a destination file system logically equivalent to the at least one source file system *(see Column 1: 29-38, "The contents of the hard disk (also referred to as the hard disk's "disk image" or "data image") define the user's personalized environment: ..." and 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image."")*.

As per **Claim 2**, the rejection of **Claim 1** is incorporated; and <u>Kedem et al.</u> further disclose:

- in which the destination image has the identical files, attributes, and structural relationships between files as the source disk *(see Column 1: 29-38, "The contents of the hard disk (also referred to as the hard disk's "disk image" or "data image") define the user's personalized environment: ..." and 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image."")*.

As per **Claim 3**, the rejection of **Claim 1** is incorporated; and <u>Kedem et al.</u> further disclose:

- creating a simulated source disk corresponding to the source disk *(see Column 8: 47-48, "This is done by emulating a disk with the mini-booter installed as a loader.")*;

- mounting the simulated source disk in the server computer, the file system software thereby automatically detecting a file system of the simulated source disk and therefore of the source disk and exposing a file system to software running on the server computer *(see Column 8: 63-67 through Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.")*; and

- intercepting sector-based I/O requests directed to the simulated source disk and retrieving source disk data from the source disk according to the intercepted sector-based I/O requests *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data.")*.

As per **Claim 4**, the rejection of **Claim 3** is incorporated; and <u>Kedem et al.</u> further disclose:

- forwarding the intercepted sector-based I/O requests to the source computer *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write requests to the appropriate RDIM 204.")*.

As per **Claim 5**, the rejection of **Claim 4** is incorporated; and <u>Kedem et al.</u> further disclose:

- loading an imaging client program in the memory of the source computer *(see Column 9: 65-67, "RDIM 204 preferably includes image manipulation tools. The image manipulation tools allow system administrators to manipulate master data images stored on RPSD 206.")*; and

- passing the intercepted sector-based I/O requests to an imaging client, an imaging client directing the intercepted sector-based I/O requests to the source disk *(see Column 10: 26-29, "It should also be noted that the propagation of write requests from LDIM 202 to RDIM 204 for the purpose of updating the master data image can be timed to best utilize the network bandwidth.")*.

As per **Claim 17**, <u>Kedem et al.</u> disclose:

- while the source disk is in an unmodified, unprepared state, for extracting the contents of the source disk and populating a destination image with the contents of the source disk such that the destination image may have a different sector-by-sector content than the source disk but a destination file system logically equivalent to the at least one source file system *(see Column 1: 29-38, "The contents of the hard disk (also referred to as the hard disk's "disk image" or "data image") define the user's personalized environment: ..." and 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image."")*.

As per **Claim 18,** the rejection of **Claim 17** is incorporated; and <u>Kedem et al.</u> further

disclose:

- a server operating system that resides in the server computer *(see Column 8: 6-7,*

"The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.");

- file system drivers within server operating system automatically detecting file

system(s) of disks mounted in the server computer *(see Column 6: 17-19, "... the operating*

system directs the request to an appropriate device driver for the physical device to which the

request was made."; Column 8: 63-67 through Column 9: 1, "The mini-booter displays the list

of available master data images and prompts the user to select one. The mini-booter

communicates the selection to LDIM 202 and then either reboots the computer or resets the

BIOS's disk geometry table to the geometry of the selected master data image.");

- an imaging server running within the server computer *(see Column 8: 43-44, "...*

LDIM 202 includes a "mini-booter" software program (not shown).") and comprising computer-

executable instructions:

- for creating a simulated source disk corresponding to the source disk *(see Column 8:*

47-48, "This is done by emulating a disk with the mini-booter installed as a loader.");

- for mounting the simulated source disk in the server computer, the file system drivers

thereby automatically detecting a file system of the simulated source disk and therefore of the

source disk and exposing a file system to software running on the server computer *(see Column*

8: 63-67 through Column 9: 1, "The mini-booter displays the list of available master data

images and prompts the user to select one. The mini-booter communicates the selection to LDIM

202 and then either reboots the computer or resets the BIOS's disk geometry table to the

geometry of the selected master data image. "); and

-   a network loopback driver intercepting sector-based I/O requests directed to the

simulated source disk and retrieving source disk data from the source disk according to the

intercepted sector-based I/O requests *(see Column 9: 9-15, "... LDIM 202 functions to intercept*

requests (for example, read/write requests) that are intended to be received by storage device

110. After a master data image is selected, upon intercepting a read request, LDIM 202 is

programmed to determine whether the cached data image or the selected master data image has

the most up to date version of the requested data. ").

As per **Claim 19**, the rejection of **Claim 18** is incorporated; and <u>Kedem et al.</u> further

disclose:

-   a network adapter forwarding the intercepted sector-based I/O requests to the source

computer *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write*

requests to the appropriate RDIM 204. ").

As per **Claim 20**, the rejection of **Claim 19** is incorporated; and <u>Kedem et al.</u> further

disclose:

-   a memory within the source computer *(see Figure 1: 110)*;

-   an imaging client installed in the memory of the source computer *(see Column 9: 65-*

67, "RDIM 204 preferably includes image manipulation tools. The image manipulation tools

allow system administrators to manipulate master data images stored on RPSD 206."), said

imaging client comprising computer-executable instructions

- for receiving any source disk I/O requests issued from the server computer to the

source computer *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for*

example, read/write requests) that are intended to be received by storage device 110."),

- for directing the intercepted sector-based I/O requests to the source disk *(see Column*

9: 9-15, "After a master data image is selected, upon intercepting a read request, LDIM 202 is

programmed to determine whether the cached data image or the selected master data image has

the most up to date version of the requested data."), and

- for passing the retrieved source disk data to the server computer in response to the

source disk I/O requests *(see Column 10: 26-29, "It should also be noted that the propagation of*

write requests from LDIM 202 to RDIM 204 for the purpose of updating the master data image

can be timed to best utilize the network bandwidth.").

Claim Rejections - 35 USC § 103

8.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9.   **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Kedem et al.** (US

6,477,624) in view of **Gold (US 7,000,231).**

As per **Claim 6**, the rejection of **Claim 5** is incorporated; however, <u>Kedem et al.</u> do not disclose:

- loading a secondary operating system in the memory of the source computer, said secondary operating system mediating I/O requests between an imaging client and the source disk.

<u>Gold</u> discloses:

- loading a secondary operating system in the memory of the source computer, said secondary operating system mediating I/O requests between an imaging client and the source disk *(see Column 3: 23-28, "A utility can then be used to reset a system identification of the computer entity, before switching to a secondary operating system to complete a build process." and 38-40, "A build process under control of a secondary "emergency" operating system can copy a fully installed primary operating system onto an operating system back-up volume.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of <u>Gold</u> into the teaching of <u>Kedem et al.</u> to include loading a secondary operating system in the memory of the source computer, said secondary operating system mediating I/O requests between an imaging client and the source disk. The modification would be obvious because one of ordinary skill in the art would be motivated to guarantee creation of an uncorrupted complete copy of the primary operating system *(see <u>Gold</u> – Column 3: 41-43)*.

10.   **Claims 7, 8, 12, 13, 15, 16, 21-23, 26, and 27** are rejected under 35 U.S.C. 103(a) as

being unpatentable over **Kedem et al.** **(US 6,477,624)** in view of **Han et al.** **(US 5,991,542)**.

As per **Claim 7**, the rejection of **Claim 3** is incorporated; and <u>Kedem et al.</u> further

disclose:

-    mounting the destination image in an uninitialized state in the server computer as a

simulated destination disk *(see Column 8: 63-67 through Column 9: 1, "The mini-booter*

displays the list of available master data images and prompts the user to select one. The mini-

booter communicates the selection to LDIM 202 and then either reboots the computer or resets

the BIOS's disk geometry table to the geometry of the selected master data image. ");

-    intercepting sector-based I/O requests directed to the simulated destination disk and

directing the contents of the intercepted sector-based I/O requests to the destination image *(see*

Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests)

that are intended to be received by storage device 110. After a master data image is selected,

upon intercepting a read request, LDIM 202 is programmed to determine whether the cached

data image or the selected master data image has the most up to date version of the requested

data. "); and

-    copying files of at least one file system of the simulated source disk to the

corresponding file system of the simulated destination disk *(see Column 9: 48-51, "It is*

envisioned that a user who uses the DIMS would initially copy the data image stored on storage

device 110 onto RPSD 206 and then always select that image as the master data image. ").

However, <u>Kedem et al.</u> do not disclose:

- retrieving partition and file system layout information from the source disk; and

- formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk.

Han et al. disclose:

- retrieving partition and file system layout information from the source disk *(see Column 4: 41-44, "A larger storage device, such as a hard disk or a file server, can be divided into many different volumes, or partitions, each of which can be formatted in a different manner.")*; and

- formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk *(see Column 4: 64-67, "This information is initially created when the volume is initialized, or formatted, and modified thereafter whenever the file management system writes information to the volume.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Han et al. into the teaching of Kedem et al. to include retrieving partition and file system layout information from the source disk; and formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk. The modification would be obvious because one of ordinary skill in the art would be motivated to create a disk image that has properties of the physical storage device *(see Han et al. – Column 3: 30-34)*.

As per **Claim 8**, the rejection of **Claim 7** is incorporated; and Kedem et al. further disclose:

- converting the intercepted sector-based I/O requests to the simulated destination disk into sector accesses within the destination image *(see Column 9: 36-39, "Upon receiving the read request, RDIM 204 locates and reads the requested data from the selected master data image stored on RPSD 206 and then transmits the data back to LDIM 202.")*.

As per **Claim 12,** the rejection of **Claim 7** is incorporated; and <u>Kedem et al.</u> further disclose:

- in which the source disk is a source virtual disk *(see Column 1: 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image."")*.

As per **Claim 13,** the rejection of **Claim 12** is incorporated; and <u>Kedem et al.</u> further disclose:

- in which the destination disk is a physical disk *(see Figure 1: 110)*.

As per **Claim 15,** the rejection of **Claim 7** is incorporated; and <u>Kedem et al.</u> further disclose:

- in which the source computer is the same as the server computer *(see Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.")*.

As per **Claim 16,** <u>Kedem et al.</u> disclose:

- in a server computer that includes an operating system that has file system software that automatically detects a file system of disks mounted in the server computer, while the source disk is in an unmodified, unprepared state, extracting the contents of the source disk and populating a destination image with the contents of the source disk such that the destination image may have a different sector-by-sector content than the source disk but a destination file system logically equivalent to the at least one source file system, with identical files, attributes, and structural relationships between files as the source disk *(see Column 1: 29-38, "The contents of the hard disk (also referred to as the hard disk's "disk image" or "data image") define the user's personalized environment: ..." and 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image.""; Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.")*;

- creating a simulated source disk corresponding to the source disk *(see Column 8: 47-48, "This is done by emulating a disk with the mini-booter installed as a loader.")*;

- mounting the simulated source disk in the server computer, the file system software thereby automatically detecting a file system of the simulated source disk and therefore of the source disk and exposing a file system to software running on the server computer *(see Column 8: 63-67 through Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.")*;

- intercepting sector-based I/O requests directed to the simulated source disk and retrieving source disk data from the source disk according to the intercepted sector-based I/O requests *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data.")*;

- forwarding the intercepted sector-based I/O requests to the source computer *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write requests to the appropriate RDIM 204.")*;

- loading an imaging client program into a memory of the source computer *(see Column 9: 65-67, "RDIM 204 preferably includes image manipulation tools. The image manipulation tools allow system administrators to manipulate master data images stored on RPSD 206.")*;

- passing the intercepted sector-based I/O requests to an imaging client, an imaging client directing the intercepted sector-based I/O requests to the source disk *(see Column 10: 26-29, "It should also be noted that the propagation of write requests from LDIM 202 to RDIM 204 for the purpose of updating the master data image can be timed to best utilize the network bandwidth.")*;

- mediating I/O requests between an imaging client and the source disk *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write requests to the appropriate RDIM 204.")*;

- mounting the destination image in an uninitialized state in the server computer as a simulated destination disk *(see Column 8: 63-67 through Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.")*;

- intercepting sector-based I/O requests directed to the simulated destination disk and directing results of the intercepted sector-based I/O requests to the destination image *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data.")*;

- converting the intercepted sector-based I/O requests to the simulated destination disk into sector accesses within the destination image *(see Column 9: 36-39, "Upon receiving the read request, RDIM 204 locates and reads the requested data from the selected master data image stored on RPSD 206 and then transmits the data back to LDIM 202.")*; and

- copying files of at least one file system of the simulated source disk to the corresponding file system of the simulated destination disk *(see Column 9: 48-51, "It is envisioned that a user who uses the DIMS would initially copy the data image stored on storage device 110 onto RPSD 206 and then always select that image as the master data image.")*.

However, <u>Kedem et al.</u> do not disclose:

- retrieving partition and file system layout information from the source disk; and

-   formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk.

Han et al. disclose:

-   retrieving partition and file system layout information from the source disk *(see Column 4: 41-44, "A larger storage device, such as a hard disk or a file server, can be divided into many different volumes, or partitions, each of which can be formatted in a different manner.")*; and

-   formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk *(see Column 4: 64-67, "This information is initially created when the volume is initialized, or formatted, and modified thereafter whenever the file management system writes information to the volume.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Han et al. into the teaching of Kedem et al. to include retrieving partition and file system layout information from the source disk; and formatting the simulated destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk. The modification would be obvious because one of ordinary skill in the art would be motivated to create a disk image that has properties of the physical storage device *(see Han et al. – Column 3: 30-34)*.

As per **Claim 21**, the rejection of **Claim 18** is incorporated; and Kedem et al. further disclose:

- a simulated destination disk generated by mounting the destination image in an uninitialized state in the server computer *(see Column 8: 63-67 through Column 9: 1, "The mini-booter displays the list of available master data images and prompts the user to select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the computer or resets the BIOS's disk geometry table to the geometry of the selected master data image.")*;

- a local loopback driver intercepting sector-based I/O requests directed to the simulated destination disk *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for example, read/write requests) that are intended to be received by storage device 110. After a master data image is selected, upon intercepting a read request, LDIM 202 is programmed to determine whether the cached data image or the selected master data image has the most up to date version of the requested data.")*;

- a local adapter comprising computer-executable instructions for converting the intercepted sector-based I/O requests to the simulated destination disk into sector accesses within the destination image *(see Column 9: 36-39, "Upon receiving the read request, RDIM 204 locates and reads the requested data from the selected master data image stored on RPSD 206 and then transmits the data back to LDIM 202.")*; and

- the imaging server further comprising computer-executable instructions for copying files of at least one file system of the simulated source disk to the corresponding file system of the simulated destination disk *(see Column 9: 48-51, "It is envisioned that a user who uses the DIMS would initially copy the data image stored on storage device 110 onto RPSD 206 and then always select that image as the master data image.")*.

However, <u>Kedem et al.</u> do not disclose:

- a local loopback driver retrieving partition and file system layout information from the source disk; and

- a formatting module comprising computer-executable instructions for formatting the destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk.

Han et al. disclose:

- a local loopback driver retrieving partition and file system layout information from the source disk *(see Column 4: 41-44, "A larger storage device, such as a hard disk or a file server, can be divided into many different volumes, or partitions, each of which can be formatted in a different manner.")*; and

- a formatting module comprising computer-executable instructions for formatting the destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk *(see Column 4: 64-67, "This information is initially created when the volume is initialized, or formatted, and modified thereafter whenever the file management system writes information to the volume.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Han et al. into the teaching of Kedem et al. to include a local loopback driver retrieving partition and file system layout information from the source disk; and a formatting module comprising computer-executable instructions for formatting the destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk. The modification would be obvious because one of

ordinary skill in the art would be motivated to create a disk image that has properties of the physical storage device *(see Han et al. – Column 3: 30-34).*

As per **Claim 22**, the rejection of **Claim 21** is incorporated; and Kedem et al. further disclose:

- in which the source disk is a virtual disk *(see Column 1: 53-62, "When the persistent storage device is a hard disk, the persistent storage device data image will frequently be called a "disk image."").*

As per **Claim 23**, the rejection of **Claim 22** is incorporated; and Kedem et al. further disclose:

- in which the destination disk is a physical disk *(see Figure 1: 110).*

As per **Claim 26**, the rejection of **Claim 18** is incorporated; and Kedem et al. further disclose:

- in which the source computer is the same as the server computer *(see Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.").*

As per **Claim 27**, Kedem et al. disclose:

- a server computer *(see Column 8: 6-7, "The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.");*

- a server operating system that resides in the server computer *(see Column 8: 6-7,*

"The DIMS is 110 a client/server system, and thus includes a client 202 and a server 204.");

- file system drivers within server operating system automatically detecting file

system(s) of disks mounted in the server computer *(see Column 6: 17-19, "... the operating*

system directs the request to an appropriate device driver for the physical device to which the

request was made.");

- an imaging server running within the server computer *(see Column 8: 43-44, "...*

LDIM 202 includes a "mini-booter" software program (not shown).") and comprising computer-

executable instructions:

- for extracting the contents of the source disk and populating a destination image with

the contents of the source disk such that the destination image may have a different sector-by-

sector content than the source disk but a destination file system logically equivalent to the at least

one source file system *(see Column 1: 29-38, "The contents of the hard disk (also referred to as*

the hard disk's "disk image" or "data image") define the user's personalized environment: ..."

and 53-62, "When the persistent storage device is a hard disk, the persistent storage device data

image will frequently be called a "disk image."");

- for creating a simulated source disk corresponding to the source disk *(see Column 8:*

47-48, "This is done by emulating a disk with the mini-booter installed as a loader.");

- while the source disk is in an unmodified, unprepared state, for mounting the

simulated source disk in the server computer, the file system drivers thereby automatically

detecting a file system of the simulated source disk and therefore of the source disk and exposing

a file system to software running on the server computer *(see Column 8: 63-67 through Column*

9: 1, "The mini-booter displays the list of available master data images and prompts the user to

select one. The mini-booter communicates the selection to LDIM 202 and then either reboots the

computer or resets the BIOS's disk geometry table to the geometry of the selected master data

image. ");

-   a network loopback driver intercepting sector-based I/O requests directed to the

simulated source disk *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for*

example, read/write requests) that are intended to be received by storage device 110. After a

master data image is selected, upon intercepting a read request, LDIM 202 is programmed to

determine whether the cached data image or the selected master data image has the most up to

date version of the requested data. ");

-   a network adapter forwarding the intercepted sector-based I/O requests to the source

computer *(see Column 10: 19-20, "In this situation, LDIM 202 merely forwards all read/write*

requests to the appropriate RDIM 204. ");

-   an imaging client installed in the memory of the source computer *(see Column 9: 65-*

67, "RDIM 204 preferably includes image manipulation tools. The image manipulation tools

allow system administrators to manipulate master data images stored on RPSD 206. "), said

imaging client comprising computer-executable instructions

-   for receiving any source disk I/O requests issued from the server computer to the

source computer *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests (for*

example, read/write requests) that are intended to be received by storage device 110. "),

-   for directing the intercepted sector-based I/O requests to the source disk *(see Column*

9: 9-15, "After a master data image is selected, upon intercepting a read request, LDIM 202 is

programmed to determine whether the cached data image or the selected master data image has

the most up to date version of the requested data. "), and

- for passing source disk data to the server computer in response to the source disk I/O

requests *(see Column 10: 26-29, "It should also be noted that the propagation of write requests*

from LDIM 202 to RDIM 204 for the purpose of updating the master data image can be timed to

best utilize the network bandwidth. ");

- a simulated destination disk generated by mounting the destination image in an

uninitialized state in the server computer *(see Column 8: 63-67 through Column 9: 1, "The mini-*

booter displays the list of available master data images and prompts the user to select one. The

mini-booter communicates the selection to LDIM 202 and then either reboots the computer or

resets the BIOS's disk geometry table to the geometry of the selected master data image. ");

- a local loopback driver intercepting sector-based I/O requests directed to the

simulated destination disk *(see Column 9: 9-15, "... LDIM 202 functions to intercept requests*

(for example, read/write requests) that are intended to be received by storage device 110. After a

master data image is selected, upon intercepting a read request, LDIM 202 is programmed to

determine whether the cached data image or the selected master data image has the most up to

date version of the requested data. ");

- a local adapter comprising computer-executable instructions for converting the

intercepted sector-based I/O requests to the simulated destination disk into sector accesses within

the destination image *(see Column 9: 36-39, "Upon receiving the read request, RDIM 204*

locates and reads the requested data from the selected master data image stored on RPSD 206

and then transmits the data back to LDIM 202. "); and

- the imaging server further comprising computer-executable instructions for copying files of at least one file system of the simulated source disk to the corresponding file system of the simulated destination disk *(see Column 9: 48-51, "It is envisioned that a user who uses the DIMS would initially copy the data image stored on storage device 110 onto RPSD 206 and then always select that image as the master data image.")*.

However, Kedem et al. do not disclose:

- a local loopback driver retrieving partition and file system layout information from the source disk; and

- a formatting module comprising computer-executable instructions for formatting the destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk.

Han et al. disclose:

- a local loopback driver retrieving partition and file system layout information from the source disk *(see Column 4: 41-44, "A larger storage device, such as a hard disk or a file server, can be divided into many different volumes, or partitions, each of which can be formatted in a different manner.")*; and

- a formatting module comprising computer-executable instructions for formatting the destination image to have the same partitioning and file system(s) as the simulated source disk and thus of the source disk *(see Column 4: 64-67, "This information is initially created when the volume is initialized, or formatted, and modified thereafter whenever the file management system writes information to the volume.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to incorporate the teaching of <u>Han et al.</u> into the teaching of <u>Kedem et al.</u> to

include a local loopback driver retrieving partition and file system layout information from the

source disk; and a formatting module comprising computer-executable instructions for

formatting the destination image to have the same partitioning and file system(s) as the simulated

source disk and thus of the source disk. The modification would be obvious because one of

ordinary skill in the art would be motivated to create a disk image that has properties of the

physical storage device *(see <u>Han et al.</u> – Column 3: 30-34)*.

11.   **Claims 9-11, 14, 24, and 25** are rejected under 35 U.S.C. 103(a) as being unpatentable

over **Kedem et al. (US 6,477,624)** in view of **Han et al. (US 5,991,542)** as applied to Claims 7

and 21 above, and further in view of **Bugnion et al. (US 6,075,938)**.

As per **Claim 9**, the rejection of **Claim 7** is incorporated; however, <u>Kedem et al.</u> and <u>Han</u>

<u>et al.</u> do not disclose:

- in which the destination image is a virtual disk file associated with a virtual computer.

<u>Bugnion et al.</u> disclose:

- in which the destination image is a virtual disk file associated with a virtual computer

(see Column 10: 5-7, "Disco virtualizes disks by providing a set of virtual disks that any virtual

machine can mount.").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to incorporate the teaching of <u>Bugnion et al.</u> into the teaching of <u>Kedem et</u>

al. to include in which the destination image is a virtual disk file associated with a virtual

computer. The modification would be obvious because one of ordinary skill in the art would be

motivated to support different sharing and persistency models *(see Bugnion et al. – Column 10:*

7-8).

As per **Claim 10**, the rejection of **Claim 9** is incorporated; and Kedem et al. further

disclose:

-   in which the source computer is a physical computer and the source disk is a physical

disk associated with the physical computer *(see Column 8: 6-7, "The DIMS is 110 a client/server*

system, and thus includes a client 202 and a server 204." and 10-12, "The DIMS also includes a

persistent storage device (PSD) 206 that can be read from and written to by RDIM 204.").

As per **Claim 11**, the rejection of **Claim 9** is incorporated; however, Kedem et al. and

Han et al. do not disclose:

-   in which the virtual disk file is a sparse virtual disk, having a predetermined capacity

and initial sector contents with null values.

Official Notice is taken that it is old and well known within the computing art to utilize a

sparse virtual disk. Applicant has submitted in the "Background of the Invention" section of the

specification that a VMM may implement a virtual disk using a sparse, sector-based image

format *(see Page 21, Paragraph [0094]).* Therefore, it would have been obvious to one of

ordinary skill in the art at the time the invention was made to include in which the virtual disk

file is a sparse virtual disk, having a predetermined capacity and initial sector contents with null

values. The modification would be obvious because one of ordinary skill in the art would be motivated to keep the virtual disk files small *(see Page 21, Paragraph [0094])*.

As per **Claim 14**, the rejection of **Claim 7** is incorporated; however, Kedem et al. and Han et al. do not disclose:

- in which the source disk is a first virtual disk associated with a first virtual computer and the destination disk is a second virtual disk associated with a second virtual computer.

Bugnion et al. disclose:

- in which the source disk is a first virtual disk associated with a first virtual computer and the destination disk is a second virtual disk associated with a second virtual computer *(see Column 10: 5-7, "Disco virtualizes disks by providing a set of virtual disks that any virtual machine can mount.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Bugnion et al. into the teaching of Kedem et al. to include in which the source disk is a first virtual disk associated with a first virtual computer and the destination disk is a second virtual disk associated with a second virtual computer. The modification would be obvious because one of ordinary skill in the art would be motivated to support different sharing and persistency models *(see Bugnion et al. – Column 10: 7-8)*.

As per **Claim 24**, the rejection of **Claim 21** is incorporated; however, Kedem et al. and Han et al. do not disclose:

- in which the destination image is a virtual disk file associated with a virtual computer.

<u>Bugnion et al.</u> disclose:

- in which the destination image is a virtual disk file associated with a virtual computer *(see Column 10: 5-7, "Disco virtualizes disks by providing a set of virtual disks that any virtual machine can mount.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of <u>Bugnion et al.</u> into the teaching of <u>Kedem et al.</u> to include in which the destination image is a virtual disk file associated with a virtual computer. The modification would be obvious because one of ordinary skill in the art would be motivated to support different sharing and persistency models *(see <u>Bugnion et al.</u> – Column 10: 7-8)*.

As per **Claim 25**, the rejection of **Claim 24** is incorporated; however, <u>Kedem et al.</u> and <u>Han et al.</u> do not disclose:

- in which the source computer is a physical computer and the source disk is a physical disk associated with the physical computer.

<u>Bugnion et al.</u> disclose:

- in which the source computer is a physical computer and the source disk is a physical disk associated with the physical computer *(see Column 10: 5-7, "Disco virtualizes disks by providing a set of virtual disks that any virtual machine can mount.")*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of <u>Bugnion et al.</u> into the teaching of <u>Kedem et</u>

al. to include in which the source computer is a physical computer and the source disk is a

physical disk associated with the physical computer. The modification would be obvious because

one of ordinary skill in the art would be motivated to support different sharing and persistency

models *(see Bugnion et al. – Column 10: 7-8).*

Conclusion

12.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

Any inquiry concerning this communication or earlier communications from the

Examiner should be directed to Qing Chen whose telephone number is 571-270-1071. The

Examiner can normally be reached on Monday through Thursday from 7:30 AM to 4:00 PM.

The Examiner can also be reached on alternate Fridays.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's

supervisor, Wei Zhen, can be reached on 571-272-3708. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the TC 2100 Group receptionist whose telephone number is 571-272-2100.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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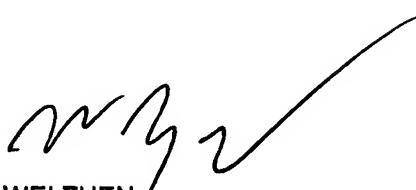
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